

IN THE CLAIMS

1. (currently amended) An apparatus for replacing at least a portion of an intervertebral disc in a spinal column, comprising:

a first member having a first vertebral contact surface for engagement with an endplate of a first vertebral bone in the spinal column and a first articulating surface, the entirety of the first articulating surface being a single saddle surface that is defined by a concave arc having a substantially constant radius of curvature A about a first axis perpendicular to an axis passing through leading and trailing ends of the first member and a convex arc having a substantially constant radius of curvature B about a first axis perpendicular to an axis passing through lateral ends of the first member; and

a second member having a second vertebral contact surface for engagement with an endplate of a second vertebral bone in the spinal column, and a second articulating surface in contact with the first articulating surface, the entirety of the second articulating surface being a single saddle surface that is defined by a convex arc having a substantially constant radius of curvature C about a first axis perpendicular to an axis passing through leading and trailing ends of the second member and a concave arc having a substantially constant radius of curvature D about a second axis perpendicular to an axis passing through lateral ends of the second member, wherein the constant radius of curvature A is non-congruent with the constant radius of curvature C and the constant radius of curvature B is non-congruent with the constant radius of curvature D+;

an intervertebral disc space is defined substantially between the first and second endplates of the first and second vertebral bones; and

the first and second members are operable to articulate relative to one another, when disposed in the intervertebral disc space, about at least one of: (i) a first center of rotation for at least one of flexion and extension that is located ~~outside the intervertebral disc space~~ above the first and

second articulating surfaces, and (ii) a second center of rotation for lateral bending that is located ~~outside the intervertebral disc space~~ below the first and second articulating surfaces.

2. (canceled)

3. (currently amended) The apparatus of claim 1, wherein:
the ~~first member includes a first articulation surface~~ has a toroidal saddle shape; and
the ~~second member includes a second articulation surface~~ has a toroidal saddle shape,

wherein the first and second articulation surfaces are sized and shaped to engage one another when the first and second members are disposed in the intervertebral disc space to enable at least one of flexion, extension, and lateral bending.

4. (canceled)

5. (currently amended) The apparatus of claim 4, wherein the first and second articulation surfaces are sized and shaped to engage one another when the first and second members are disposed in the intervertebral disc space to enable the first and second vertebral bones to at least axially rotate relative to one another through a range of angles.

6. (original) The apparatus of claim 5, wherein the radius A of the concave arc is greater than the radius C of the convex arc in order to permit axial rotation of the first and second vertebral bones relative to one another.

7. (original) The apparatus of claim 5, wherein the radius D of the concave arc is greater than the radius B of the convex arc in order to permit axial rotation of the first and second vertebral bones relative to one another.

8. (original) The apparatus of claim 5, wherein the first and second articulation surfaces are sized and shaped to achieve substantial point-to-point contact relative to one another when the spinal column is in at least some positions of flexion, extension, lateral bending, and/or axial rotation.

9. (original) The apparatus of claim 5, wherein the first and second articulation surfaces are sized and shaped to engage one another when the first and second members are disposed in the intervertebral disc space to enable the first and second vertebral bones to axially rotate relative to one another through the range of angles without substantially displacing the first and second vertebral bones away from one another.

10. (original) The apparatus of claim 9, wherein the range of angles is about plus/minus three degrees from a resting position.

11. (original) The apparatus of claim 9, wherein the first and second articulation surfaces are sized and shaped such that the first and second vertebral bones are displaced away from one another at axial rotations outside the range of angles.

12. (currently amended) The apparatus of claim 41, wherein at least one of: (i) the first and second axes perpendicular to the anterior-posterior plane of the spinal column are substantially coaxial; and (ii) the first and second axes perpendicular to the lateral plane of the spinal column are substantially coaxial.

13. (currently amended) The apparatus of claim 41, wherein at least one of: (i) the first and second axes perpendicular to the anterior-posterior plane of the spinal column lie in a plane that is substantially perpendicular to the anterior-posterior plane; and (ii) the first and second axes perpendicular to the lateral plane of the spinal column lie in a plane that is substantially perpendicular to the lateral plane.

14. (canceled)

15. (currently amended) An apparatus for replacing at least a portion of an intervertebral disc in a spinal column, comprising:

first means having a first surface for engagement with an endplate of a first vertebral bone in the spinal column; and

second means having a second surface for engagement with an endplate of a second vertebral bone in the spinal column, wherein the first and second members have opposing first and second articulating surfaces that are in contact with one another, the entirety of the first articulating surface being a single saddle surface that is defined by a concave arc having a substantially constant radius of curvature A about a first axis perpendicular to an axis passing through leading and trailing ends of the first member and a convex arc having a substantially constant radius of curvature B about a first axis perpendicular to an axis passing through lateral ends of the first member, the entirety of the second articulating surface being a single saddle surface that is defined by a convex arc having a substantially constant radius of curvature C about a first axis perpendicular to an axis passing through leading and trailing ends of the second member and a concave arc having a substantially constant radius of curvature D about a second axis perpendicular to an axis passing through lateral ends of the second member, the constant radius of curvature A being non-congruent with the constant radius of curvature C and the constant radius of curvature B being non-congruent with the constant radius of curvature D;

an intervertebral disc space is defined substantially between the first and second endplates of the first and second vertebral bones, and

the first and second means are operable to articulate relative to one another, when the first and second means are disposed in the intervertebral disc space, about at least one of: (i) a first center of rotation for at least one of flexion

and extension that is located ~~outside the intervertebral disc space~~above the first and second articulating surfaces, and (ii) a second center of rotation for lateral bending that is located ~~outside the intervertebral disc space~~below the first and second articulating surfaces.

16. (currently amended) An apparatus for replacing at least a portion of an intervertebral disc in a spinal column, comprising:

a first member having a first vertebral contact surface for engagement with an endplate of a first vertebral bone in the spinal column, and having a first articulation means, the entirety of the first articulating surface being a single saddle surface that is defined by a concave arc having a substantially constant radius of curvature A about a first axis perpendicular to an axis passing through leading and trailing ends of the first member and a convex arc having a substantially constant radius of curvature B about a first axis perpendicular to an axis passing through lateral ends of the first member; and

a second member having a second vertebral contact surface for engagement with an endplate of a second vertebral bone in the spinal column, and having a second articulation means, the entirety of the second articulating surface being a single saddle surface that is defined by a convex arc having a substantially constant radius of curvature C about a first axis perpendicular to an axis passing through leading and trailing ends of the second member and a concave arc having a substantially constant radius of curvature D about a second axis perpendicular to an axis passing through lateral ends of the second member, wherein the constant radius of curvature A is non-congruent with the constant radius of curvature C and the constant radius of curvature B is non-congruent with the constant radius of curvature A, wherein the constant radius of curvature A is non-congruent with the constant radius of curvature C and the constant radius of curvature B is non-congruent with the constant radius of curvature D+;

an intervertebral disc space is defined substantially between the first and second endplates of the first and second vertebral bones, and

the first and second articulation means are operable to articulate relative to one another, when the first and second members are disposed in the intervertebral disc space, about at least one of: (i) a first center of rotation for at least one of flexion and extension that is located ~~outside the intervertebral disc space~~above the first and second articulation means, and (ii) a second center of rotation for lateral bending that is located ~~outside the intervertebral disc space~~below the first and second articulation means.